

Global Warming was not Proved at Showa Base in Antarctica

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ABSTRACT

The changes in temperatures at Showa base in Antarctica were evaluated. Various parameters of temperatures at Showa base in Antarctica were obtained from Japan Meteorological Agency. Parameters of temperatures were not correlated with years at Showa base (mean temperature in a year: $r = 0.056$, $p = 0.7267$). In addition, the number of days over 4°C was negatively correlated with years. Global warming was not proved at Showa base in Antarctica in this study.

Keywords: Temperature, Showa Base, Antarctica, Global Warming

1. Introduction

The world is a very different place today than it was only a short period ago. Also in Japan, urbanization and industrialization are accelerated. Global average temperatures are projected to increase by the end of this century. An increase in mortality related to heat waves has been reported from various industrialized countries [1-3]. For example, we have previously showed that estimated changes in mean temperature was 1.8°C for 50 years in Takamatsu areas, Japan [4]. In addition, by using monthly data, higher temperature was associated with ambulance transports in Takamatsu [5] and Okayama [6] areas, Japan. However, we could not found positive change in temperatures in Hachijo Inland, Japan [7], and whether an increase in temperatures is actually increasing in the world remains to be investigated. Therefore, the chronological changes in temperatures at Showa base in Antarctica were explored.

2. Methods

Daily temperatures at Showa base (69°00'S 39°35'E) in Antarctica (1969-2009) were obtained from Japan Meteorological Agency [8]. Mean temperature, mean of the highest temperatures and mean of the lowest temperatures in January, August and a year were used for analysis. In addition, the changes in the number of days over various temperatures in January and those under various

temperatures in August were also evaluated.

Simple correlation analysis was used to test the significance of the linear relationship among continuous variables: $p < 0.05$ was considered to be statistically significant. Statistical analysis was performed with StatView 5.0 (SAS Institute Inc., Cary, NC, USA).

3. Results

Mean temperature, mean of the highest temperatures and mean of the lowest temperatures in January, August and a year at Showa base were not significantly correlated with years (mean temperature in a year: $r = 0.056$, $p = 0.7267$) (**Table 1, Figure 1**). In addition, we evaluated the relationship between years and various levels of temperatures in January and August at Showa base (**Table 2**). The number of days of over 3, 4 and 5°C in January was negatively correlated with years (**Figure 2**). Coefficient rate between years and over 4°C was the highest in January. However, the number of days under -25°C was not correlated with years in August ($r = -0.205$, $p = 0.1984$).

4. Discussion

Although we previously found positive changes in temperatures in Takamatsu and Okayama areas, Japan, clinical impact of global warming effect at Showa base in Antarctica was not noted in this study.

Table 1. Relationship between parameters of temperature and years at Showa base.

| | January | | August | | Total | |
|---------------------------------|----------|----------|----------|----------|----------|----------|
| | <i>r</i> | <i>p</i> | <i>r</i> | <i>p</i> | <i>r</i> | <i>p</i> |
| Mean Temperature | -0.191 | 0.2328 | 0.206 | 0.1961 | 0.056 | 0.7267 |
| Mean of the Highest Temperature | -0.303 | 0.0546 | 0.217 | 0.1727 | -0.005 | 0.9743 |
| Mean of the Lowest Temperature | -0.097 | 0.5473 | 0.226 | 0.1551 | 0.088 | 0.5847 |

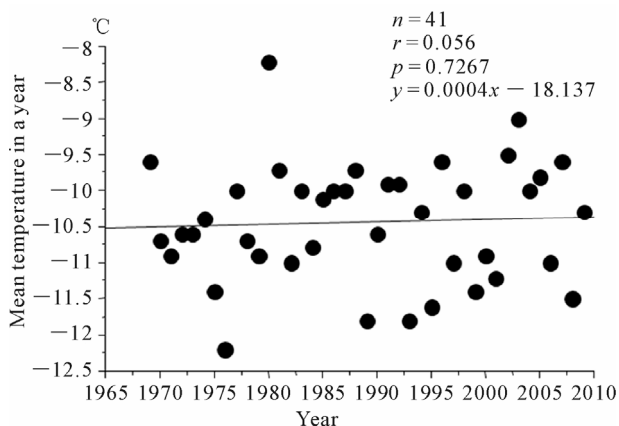


Figure 1. Simple correlation analysis between mean temperature in a year and years at Showa base in Antarctica (1969~2009).

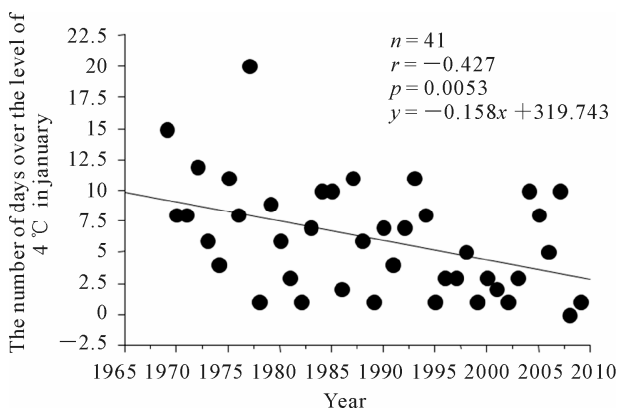


Figure 2. Simple correlation analysis between the number of days over 4°C in January and years at Showa base in Antarctica (1969~2009).

Table 2 Relationship between years and various levels of temperature in January and August at Showa base in Antarctica.

| | January | | August | |
|-------|----------|---------------|----------|---------------|
| | <i>r</i> | <i>p</i> | <i>r</i> | <i>p</i> |
| 0°C ≡ | -0.030 | 0.8503 | ≡ -25°C | -0.205 0.1984 |
| 1°C ≡ | -0.144 | 0.3681 | ≡ -26°C | -0.237 0.1356 |
| 2°C ≡ | -0.272 | 0.0858 | ≡ -27°C | -0.207 0.1936 |
| 3°C ≡ | -0.348 | 0.0258 | ≡ -28°C | -0.165 0.3039 |
| 4°C ≡ | -0.427 | 0.0053 | ≡ -29°C | -0.120 0.4563 |
| 5°C ≡ | -0.407 | 0.0083 | ≡ -30°C | -0.156 0.3299 |

Average subsurface temperature profiles in four Asian cities (Tokyo, Osaka, Seoul and Bangkok) were compared and analyzed to evaluate the effects of surface warming [9]. The magnitude of surface warming was the largest in Tokyo (2.8°C), followed by Seoul, Osaka and Bangkok. Nakai *et al* investigated heat-related deaths in Japan from 1968 through 1994 and heat-related deaths were most prone to occur on days with a peak daily temperature above 38°C [10]. In addition, they reported that incidence of heat-related deaths showed an exponential dependence on the number of hot days [10]. Bai *et al.* also showed that the number of unusual deaths in the summer of 1994 in Osaka, Japan was more compared to those of previous years [11]. Qui *et al.* reported that an unusually hot spell in 1999 was followed by a high mortality rate in Hokkaido, Japan [12]. When the air temperature is over 34°C, cardiovascular and nervous disorders can occur as a result of problems associated with body temperature adjustment and metabolism of water and salts [12]. Unexpectedly high temperatures are particularly difficult for chronic diseases [13] and the elderly [14,15].

However, mean temperature in a year was not correlated with years in this study. In addition, the number of days of over 4°C in January was negatively correlated with years. Although the mechanism was not proved in this study, the evidence of global warming was not proved at Showa base in Antarctica. Further observation was urgently required to prove the global warming.

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